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CONTRIBUTIONS

TO

THE MINERALOGY OF NOVA SCOTIA.

BY

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I.

IN the present series of communications I propose giving such analytical details and other information interesting to the mineralogist as have accumulated during several years' study of the minerals of Nova Scotia, and have not appeared in my previous papers*, and such as I may continue to obtain. In a succession of articles in the Transactions of the Nova Scotia Institute of Natural Science, the mineralogy of the province is being considered from an economic point of view†. In the last

* These papers are the following:—

"On the Occurrence of Natroborocalcite in Gypsum of Nova Scotia" (Silliman's Journal, 1857).

"Analysis of Faroëlite and some other Zeolitic Minerals occurring in Nova Scotia" (Silliman's Journal, 1858).

"Analysis and Description of Three New Minerals from Trap of Nova Scotia" (Edinb. New Phil. Journ. 1859).

"On an Oil-Coal from Pictou Co., Nova Scotia" (Silliman's Journal, and Edinb. New Phil. Journ. 1860).

"On Gyrolite occurring in Trap of Nova Scotia" (Edinb. New Phil. Journ., and Silliman's Journal, 1861).

"On Natroborocalcite and another Borate in Gypsum of Nova Scotia" (Silliman's Journal, 1861).

"On Pickeringite occurring in Nova Scotia" (Quart. Journ. Chem. Soc. 1863).

"On Mordenite, a New Mineral from Trap of Nova Scotia" (Quart. Journ. Chem. Soc. 1864).

† "Notes on the Economic Mineralogy of Nova Scotia" (Trans. Nova Scotia Institute, parts 1 & 2).

of these I described the ores of manganese and their uses; and I select for the first subject in the present series of papers these ores, more particularly with reference to their chemical composition and mineralogical characters.

Manganite.—This species occurs abundantly at Cheverie, on the south shore of the Basin of Minas, in Hants Co., where it is found in nodules, sometimes of considerable size, on the beach, about twenty rods above high-water mark, and on the upland nearly two miles from the water. It is also met with at Walton, some miles to the east of Cheverie on the Petite River, where I have picked it up in the fields, and where a bed of it is said to crop out in a low hill on the river-side. It is mostly of compact crystalline structure, of a dark-grey colour, gives a brown streak and powder, and has hardness a little above 5. In the compact pieces small cavities are sometimes found, lined with black lustrous prismatic crystals affording a brown streak; these most probably consist of the essential elements of the species. The mineral is associated with barytes and calcite, and sometimes with pyrolusite. The geological formation of the surrounding district is lower carboniferous; the prevailing rocks are gypsum and limestone, sometimes containing magnesia, the latter being that in which I believe the ores of manganese always occur in this part of Nova Scotia.

A specimen from Cheverie was analyzed: the water and oxygen were determined by ignition in connexion with a tube filled with chloride of calcium; the amount of binoxide of manganese was ascertained by the oxalic-acid process, and the corresponding quantity of sesquioxide calculated; the siliceous gangue containing a small amount of barytes was estimated by action with hydrochloric acid as a solvent for the soluble constituents, among which were a little iron and baryta, which were not weighed. The results were these:—

Water	10·00
Sesquioxide of manganese* .	86·81
Gangue	1·14
Oxide of iron, baryta, and loss.	2·05
	100·00

The amount of oxygen lost on ignition was 3·57 per cent., and the theoretical loss, in the change of the Mn^2O^3 found into Mn^3O^4, is 3·01. These numbers leave no doubt that the mineral is the hydrated *sesquioxide of manganese or manganite,* the theoretical composition of which is—

* Binoxide found = 47·73.

considered to be of the age of the Hudson-River group, about Merigomish in the eastern part of the province. It is of an ash-grey colour, a somewhat schistose structure and close texture, adheres slightly to the tongue, and feels rather soapy on smooth surfaces; it has a glimmering lustre, and is most readily cut with a knife; its hardness is 1·5, its powder and streak are greyish white. From the circumstance of excellent soft but firm pencils, much prized for writing on slates, being made from it, it receives its local name. Analysis shows it to belong to the clay-slate family; it was at first taken for pyrophyllite, the compact variety of which, used in the United States for making pencils, it much resembles. It also in some respects agrees with agalmatolite, with which the compact pyrophyllite had been confounded before Brush pointed out that they were really distinct (Silliman's Journal, July 1858, p. 69). Its specific gravity is 2·71. In the following analysis, although the finely powdered mineral was fused with about four times its weight of the mixed alkaline carbonates, the alumina was not *perfectly* separated from the silica, but the quantity retained was not large enough to be material. The presence of potash and soda was proved by fusion with chloride and carbonate of barium, and subsequent testing with bichloride of platinum in alcohol. The iron is given as protoxide, because it was found that after fusion an exceedingly small amount of peroxide was present, which might have been formed in the process. The results obtained were—

Silica (retaining a very little Al^2O^3)	60·53
Alumina	23·01
Protoxide of iron	5·30
Potash and trace of soda	4·39
Magnesia	1·42
Water	5·35
	100·00

which have a general accordance with those found in the analyses of clay-slate given by Dana (Mineralogy, 4th edit. p. 510), one of which is as follows, the specimen examined being a bluish-black clay-slate from Rothwaltersdorf:—

Silica	61·72
Alumina	19·55
Protoxide of iron . . .	8·54
Lime	0·55
Potash	4·81
Magnesia	1·08
Water	3·74
	99·99

sions of which have not, so far as I know, been fully made out, but which have afforded many tons of good ore. The whole thickness of the limestone holding manganese is estimated at about 300 feet.

The minerals associated with pyrolusite at Teny Cape are iron ore (brown hematite, I believe), barytes, and calcite. The first of these is occasionally found at the line of junction of the ore and rock, which, as before mentioned, is sometimes red. The barytes is of pure-white colour, is often disseminated in varying quantity through the pyrolusite, and is probably constantly present in all but the pure crystals of the species. The calcite is also occasionally imbedded, in transparent crystals, but more often exists as an incrustation; it sometimes forms specimens of great beauty, when it lies in opake snow-white mammillary masses of finely-crystalline structure, or in piles of nail-head crystals, half an inch or an inch across, of grey or snow-white colour, on black lustrous masses of well-crystallized pyrolusite.

The pyrolusite found at Walton is sometimes attached to brown hematite in a reddish limestone resembling that at Teny Cape.

The forms of the mineral are various. It is generally highly crystalline. The masses at Teny Cape are sometimes of a grey black and consist of closely-packed fine long fibres, sometimes are made up of bunches of stellated short crystals, and often of distinct and lustrous jet-black crystals with perfect terminations: all these varieties yield readily to the knife. The Pictou ore (found at a distance of about seventy miles) is coarsely fibrous. The greater part of that from Walton is in soft, black, lustrous, short crystals; one specimen, however, has been met with almost crypto-crystalline in structure and of bluish-grey colour, closely resembling the ore from Saxony. A very similar specimen from Amherst, Cumberland Co., forty miles from Walton, gave on analysis in the air-dry state,

Water	0·61
Binoxide of manganese .	97·04
Gangue and loss . . .	2·35
	100·00

The insoluble matter (gangue) was brownish white, and most probably consisted of barytes.

I have no doubt that specimens of the greatest possible purity could be selected at Teny Cape. I have examined a good many samples of dressed ores, and have commonly found from 80 to 93 per cent. binoxide; a specimen obtained at a depth of 50

Bitumen in Calcite.—This interesting addition to the minerals of the province was made by W. Barnes, Esq., Mining Engineer of Halifax, who kindly furnished me with specimens, and gave me some details as to its mode of occurrence. It is found in Inverness co., Cape Breton, in an elevated range of altered rocks in which the lower carboniferous strata are apparent. Limestone is abundant but very much altered, and rests at a high angle of inclination on altered black shales containing much pyrites; gypsum also occurs in the neighbourhood.

The mineral is dull black externally; it breaks with a conchoidal fracture, giving a very brilliant jet-black surface. It is scattered in separate masses on the surface of a highly siliceous rock, containing pyrites among calcite in six-sided prisms and in dog-tooth crystals. Some of these masses are an inch or more in length, of rounded outline, and lie free; others, smaller, are nearly surrounded by groups of crystals; in one case a mass is imbedded in a nearly transparent crystal; and sometimes the calcite when broken exposes a brilliant surface of enclosed mineral. These masses look occasionally like a drop of black wax melted on to a crystal of calcite, and are sometimes perfectly globular. It is brittle and affords a black powder. In a closed tube it softens, swells, gives a bituminous odour and a little oil. On platinum it swells up and burns with a smoky flame to a bulky black porous residue, not having the coherence of coke, and finally leaves a very small ash. It sinks in benzine and floats in bisulphide of carbon; so that its specific gravity is probably about 1·1: it dissolves to a small extent only in these menstrua, and after being boiled in them is readily powdered under a glass rod. It cannot be distinguished in appearance from the Albertite of New Brunswick, the mineral which has been called Albert coal and New-Brunswick asphalt. It resembles this mineral also in being slightly affected by benzine; but it dissolves somewhat less freely in bisulphide of carbon, which I find to become rapidly coloured on Albertite, especially when heated (this property does not seem to have been noticed in the discussion as to the character of this mineral). Side by side with Albertite on an iron plate on which tin had been melted for a short time, it smelt of bitumen, became tough and somewhat elastic, and finally rubbed down to a brownish-black powder, while the Albertite scarcely smelt, but also became tough and somewhat elastic under a glass rod, and rubbed down to a black powder. I regret not being able to compare the composition of these minerals: Professor Anderson of Glasgow was kind enough to undertake an ultimate analysis of the Cape-Breton bitumen, but at the close of the combustion an unfortunate accident deprived him of the results. There appears unquestionably to be

Bischoff (Quart. Journ. of Science, October 1864, p. 688) in a specimen of pyrolusite from an unmentioned locality.

The majority of the localities affording pyrolusite in this province are almost certainly known to belong to the lower carboniferous beds; the country-rock of the ores has not in all cases been made known. I saw last summer, in a locality about five miles from the quartz and manganite conglomerate before mentioned, which may be of New Red Sandstone age, a hard highly siliceous rock, apparently quartzite (contiguous to slate), from which about a ton of ore, consisting of pyrolusite and psilomelane, had been recently taken.

Wad.—This is found in various parts of the province, sometimes in abundance. One specimen, of black colour, from a considerable bed situated, I believe, to the east of Halifax, gave me, when dried at 212°, 56 per cent. binoxide of manganese, a great deal of iron, a little cobalt, and a large quantity of insoluble matter. In specimens of brown "paints" I have found from 11 to 20 per cent. binoxide of manganese, the greater part of the residue being water and peroxide of iron.